Fifth Report to the Legislature
State of Hawaii
2004 Regular Session

Implementation of Chapter 190D, Hawaii Revised Statutes
Ocean and Submerged Lands Leasing

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Department of Land and Natural Resources
and
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In response to Act 176 (Section 12), Session Laws of Hawaii 1999

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On the cover:

The next big fish to come out of open ocean cage culture is the Hawaiian amberjack *(Seriola dumerili),* better known as *Kahala* or *Kampachi*. Kona Blue Water Farms has begun to market a small amount of tank-raised Kahala (pictured) from their farm at the Natural Energy Laboratory of Hawaii Authority, with plans to produce the fish in large quantities offshore. Other pending cage ventures have indicated that they intend to raise Kahala.

Kahala, a cousin of the Hamachi, a popular sushi bar fish from Japan, are extremely fast growing animals, reaching 3 to 4 pounds in one year. Hawaii farm raised Kahala have been drawing rave reviews by top white-table cloth restaurants and sushi bars. Kahala's large size and oily, firm flesh makes it ideal for both sushi and fillet dishes. This versatility increases the potential target markets outside of Hawaii, to include the US Mainland, Japan and Europe.

Photo credit: Kona Blue Water Farms

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1.0 Introduction

Act 176, Session Laws of Hawaii (SLH) 1999, was enacted on July 1, 1999, allowing greater utilization of Hawaii's ocean resources for research and sustainable commercial development of open ocean aquaculture. The law requires the Department of Land and Natural Resources (DLNR), in cooperation with the Department of Agriculture (DOA), to submit a progress report to the Legislature on the implementation process prior to each regular session. This Report, the fifth in the series, addresses the progress with implementing ocean leasing, as well as, highlights of related national and local research and development initiatives in 2003.

2.0 National Activities and Hawaii Participation

In 1999, the United States (U.S.) Department of Commerce (DOC) established a bold long-term, national vision for the U.S. marine aquaculture industry. Ambitious objectives to be met by 2025 included:

a. Increase the value of domestic aquaculture production from the present $900 million annually to $5 billion;

b. Increase the number of jobs in aquaculture from the present estimate of 180,000 to 600,000;

c. Develop aquaculture technologies and methods both to improve production and safeguard the environment, emphasizing where possible those technologies that employ pollution prevention;

d. Double the value of non-food products and services produced by aquaculture in order to increase industry diversification;

e. Enhance depleted wild fish stocks through aquaculture, thereby increasing the value of both commercial and recreational landings; and

f. Increase exports of U.S. aquaculture goods and services from the present value of $500 million annually to $2.5 billion (U.S. DOC, 1999).

Hawaii, with its abundant marine resources, is striving to play a key role in the implementation of national policy for marine aquaculture (Table 1). For example, in 1999 and 2000, a collaboration of private, State and University parties demonstrated the economic and environmental feasibility of offshore cage culture in Hawaiian waters. The federally funded Hawaii Offshore Aquaculture Research Project (HOARP) produced and sold 115,148 pounds of the popular local fish, moi or Pacific threadfin, from a cage that for the first time was operated totally submerged (Sea Technology, 2001).

Table 1: Hawaii's Marine Resources

Island Chain	-	1,500 miles long
Coastline	-	746 miles
State Marine Waters	-	2.8 million acres
Federal Marine Waters	-	565 million acres

Based on these initial successes, which were reported on around the World, Hawaii aquaculture interests are considered among the leaders in commercializing open ocean aquaculture technology. Overall, the State growth strategy for open ocean aquaculture has focused on creating a supportive policy framework and developing a critical mass of research and development activities to further demonstrate the long-term sustainability of extending the Hawaii industry offshore.

2.1 National Marine Aquaculture Initiative, National Sea Grant Program

The National Sea Grant Program in 1999 established a national strategic research initiative in marine aquaculture. The initiative strives to fund innovative research, policy, and regulatory analysis and development, and outreach and demonstration for the development of marine aquaculture in the United States.

Initially, $5M a year was made available for this initiative and expanding open ocean aquaculture is a priority target for the Program. The overall purpose of the ongoing effort is to develop a highly competitive, sustainable marine aquaculture industry that will meet growing U.S. consumer demand for aquatic foods and products.

Outside Hawaii, four offshore cage culture demonstration projects were funded by the national initiative, i.e., marine fish and shellfish culture off New Hampshire, marine fish culture off Puerto Rico, marine fish culture in the Gulf of Mexico off Mississippi using an oil platform, and marine fish culture using an oil platform off California. All these projects consisted of operating one or two cages, using various local species of fish and shellfish, stocked at less than commercial densities. In addition, there were several individual research projects at various universities focused on such important topics as increasing the variety of marine species available for stocking through hatchery development, new technologies for improved farming methods and various critical planning and policy issues related to U.S. offshore development.

This National Marine Aquaculture Initiative (NMAI) funded the highly successful HOARP effort off Ewa Beach, Oahu (Ostrowski et al., 2001). During the past NMAI funding cycle, Hawaii interests again received a portion of the available funds.

A joint research project between the Oceanic Institute (OI) and University of Hawaii (UH) received $800,000 over two years to define constraints associated with the impacts of cage culture on water quality, particularly as they affect Zone of Mixing (ZOM) regulations for cage effluents. ZOM is a regulatory approach that defines an area of ocean where water quality standards can be exceeded, thus allowing dilution of effluents from cages (Bay 1995).

Now in its second year, this research is utilizing the commercial project being developed by Cates International, Inc. to carry out the following: 1) Develop a computer model to determine the size and shape of the regulatory mixing zone for cage effluents; 2) Conduct water quality and organic loading surveys to collect data to develop and test the ZOM model; and 3) Conduct oceanographic surveys to provide data to develop and test the ZOM model. In addition, additional research is being carried out by OI on hatchery techniques for other economically important Hawaiian species. Understanding both the environmental impacts of ocean cage culture and the life cycles and culture potentials of economically important species, are critical to expansion not only in Hawaii, but also at a national level.

Recent action by Congress on their Fiscal Year 04 Budget, including a strong push by Hawaii's Congressional Delegation, have continued the NMAI funding at $3.1M a year for two years. As of this writing, research proposals are again

being requested by the National Sea Grant Program and Hawaii interests will be submitting several ideas.

2.2 Leasing Regime Federal Marine Waters

In late 1999 and 2000, the Center for the Study of Marine Policy, University of Delaware, completed a collaborative, multi-disciplinary study to develop a policy framework for governing marine aquaculture in Federal waters off the coast of the U.S. The intent of the work was to support ongoing and future policy initiatives within the Federal government with respect to offshore aquaculture; leading eventually to development of a general policy for U.S. management of all resources in the Exclusive Economic Zone (EEZ). The Manager of the Hawaii Aquaculture Development Program (ADP) served on the Advisory Committee and shared Hawaii's recent experiences with offshore aquaculture development.

The report to the Congress in early 2001, titled "Development of a Policy Framework for Offshore Marine Aquaculture in the 3-200 Mile U.S. Ocean Zone" included 15 recommendations covering: planning, permitting, environmental reviews and public participation, leasing, administering agency, operations and monitoring and abandonment of facilities (Cicin-Sain et al., 2001).

As a result of the successful policy study, a follow-on proposal was made by the University of Delaware to the National Sea Grant Office entitled, "Development

and Testing of an Operational Framework for Offshore Aquaculture in Conjunction with Stakeholders at National and Regional Levels" and was funded for two years at $488,000. The ADP Manager was asked to be a member of the multi-disciplinary, multi-regional team to carry out the study. The study will develop operational guidelines for implementation of a policy framework reflecting input from federal agencies, coastal states, and stakeholder groups, then test and tailor the operational framework in three regions currently involved in offshore aquaculture: New England, the Gulf of Mexico, and Hawaii and the Pacific.

At this writing, the study team has produced a final draft of a report describing operational guidelines for leasing sites for commercial aquaculture in the EEZ, which is currently undergoing final editing before being sent to National Sea Grant and Congress. The final document will include sections on: Planning and Site Assessment; Joint Permitting; Environmental Review; Leasing of Offshore Sites; Operation and Monitoring of Facilities; Compliance and Enforcement; and Administration and Implementation. Clearly, Hawaii participation in this study that could strongly impact commercial use of the EEZ, gives Hawaii and Pacific interests an opportunity to "get in on the ground floor" in developing a new national initiative for farming federal marine waters.

2.3 Hawaii Ocean Mapping Project

Dr. Leonard Young of ADP and Dr. Charles Helsley of UH combined efforts to receive initial funding from the National Sea Grant Office to determine and map potential offshore aquaculture sites within the waters of the main Hawaiian Islands, including identifying potential sites for offshore aquaculture parks. A team was assembled consisting of ADP, UH and the Office of Planning of the Department of Business, Economic Development and Tourism, which manages the State Geographic Information System (GIS).

Funds of $95,000 were initially received from the Sea Grant strategic initiative for Phase I of the work. Currently Phase II of the project is being completed, with additional federal funds from the Coastal Zone Management Program. Objectives include:

1) Review of the Phase I and II site characteristics of HOARP to develop a checklist of good site baseline characteristics.

2) Identify and review existing oceanographic, biological and ecological data from Federal, State, University and private sources, as well as determine existing and future commercial, military and recreational use patterns to anticipate and mitigate multiple use conflicts.

3) Gather and analyze information and put it into a computerized GIS and use the database to determine the best sites for offshore aquaculture farming.

4) Identify and evaluate Federal and State policies and regulatory regimes governing open ocean aquaculture development in Hawaii and formulate recommendations for changes that would streamline development.

Currently there is a prototype database on the State GIS computer and the final information layers are being added. The final tasks in Phase II focus on: creation of preliminary GIS maps of State marine waters around the main Hawaiian Islands, development of access procedures for the public, and development of recommendations to improve State leasing policies and processes (Young et al., 2003).

2.4 New Species Research

The future of offshore aquaculture expansion for Hawaii is strongly dependent on development of mass rearing techniques for a variety of economically important native species. Existing policy does not permit stocking non-native species offshore.

Currently, native pearl oysters are available to farmers and the only fish species that makes economic sense and is available in sufficient quantities, is the Pacific threadfin or moi. The challenges to the control of the life cycle of marine fish species are formidable because of difficulties in spawning broodstock and the extremely small larvae that hatch. Providing sufficiently small and nutritious live and artificial feeds to newly hatched marine fish larvae is a major bottleneck to commercial development everywhere.

However, public and private sector researchers in Hawaii continue to pursue development of new species and have had recent successes. To illustrate:

1) The UH Hawaii Institute of Marine Biology (HIMB) is actively studying the fisheries biology of the deep-water snappers ehu, onaga and opakapaka, with support from the State and the Federal government. Initial experiments to grow out larvae are promising on a small, laboratory scale. These efforts have recently been extended through collaborative research with a commercial project, Kona Blue Water Farms, Inc. (KBWF), and their new research hatchery facility in Kona on the Island of Hawaii.

2) OI, with federal and state funding, has been carrying out extensive hatchery work on several local ocean species. Building on their success in mass-producing moi fingerlings, OI scientists are also producing limited quantities of stockable size amberack and other related jack species (Ostrowski, 2001,

3) Sing 2002). At the same time, OI researchers are improving on large scale, hatchery-rearing techniques for moi and OI can be contracted to produce large quantities of moi fingerlings. In early 2004, OI in cooperation with Cates International (CI), will carry out an experimental hatchery run for amberjack or kahala, sponsored through DOA. These fish will be stocked in one of CI's offshore cages for experimental growout.

4) KBWF, a private facility at the Natural Energy Laboratory of Hawaii Authority (NELHA), recently received a three-year, $1.5M federal grant to develop a live feed system for marine fish larvae. The grant is from the Advanced Technology Program in the U.S. DOC, which provides monies to undertake challenging research and development projects that have broad-based economic or social benefit. Targeted fish species for this project include the mahimahi, deep-water snappers, kahala, and a local grouper (PBN, 2001). As of this writing, KBWF has had great success in spawning and mass rearing kahala and ulua species and limited success with several other marine species.

3.0 Status of Commercial Development

3.1 Status of Initial Lease Applications

Passage of the amendments to Chapter 190D, HRS, in 1999 and the success of the HOARP project, led to two companies attempting the new process to obtain a lease. These companies became the initial "test cases" for the State's ocean permitting and leasing processes. Both were active in the 1999 Legislative process to amend Chapter 190D, HRS, and both had complimentary business experiences that made them excellent candidates to be the "pioneers" to work out the details on how the ocean leasing law, as amended, would be implemented. The companies were CI of Honolulu and Black Pearls, Inc. (BPI) of Kailua-Kona.

CI was formed to pursue open ocean commercial cage culture of fish in Hawaiian waters. The principals had considerable experience with commercial fishing, diving, boating services, as well as business. CI personnel were an instrumental part of the team that carried out the highly successful HOARP.

On April 10, 2000, CI submitted all Federal, State and County permits for a four-cage project using 28 acres of ocean two miles off Ewa Beach, Oahu. On March 9, 2001, approximately 12 months after DLNR accepted the application; the Board of Land and Natural Resources (BLNR) authorized a lease. This was not only the first lease approved under the amended Chapter 190D, HRS, but is considered by Federal officials to be the first open ocean aquaculture lease in the Nation (Sea Technology, 2001). The actual lease document was signed in August of 2002.

Since the lease approval, CI has followed its business plan and currently manages three submersible cages, with plans to deploy the fourth cage early in 2004. Due to shortages in the supply of fingerlings, the three cages have never reached optimum stocking densities. However, weekly production has steadily increased between 5,000 and 7,000 pounds a week.

CI has done an outstanding job in marketing their product and working with a local distributor. Sales are directed at local restaurants and seafood markets, and "white table cloth" restaurants locally and on the West Coast. CI has taken a "hands on" approach to introducing its premium quality fish to local chefs, which has included taking chefs and restaurant staff out to their site to watch a harvest. CI's successful efforts recently received recognition, when the Company was given an award by the Governor for being the 2003 New Exporter of the Year (PBN, 2003).

Future plans for CI include launching a second offshore cage culture site off Oahu focusing on growing kahala. CI believes that this rapidly growing species has an even larger export market than moi. CI is also currently looking for an Oahu site to build a large-scale hatchery, so that they can supply their own fingerlings.

The second pioneering company, BPI is located at NELHA in Kona. It is a cutting-edge research and development company that consults in pearl oyster hatchery development and develops commercial pearl farms around the world. Pearl oysters are grown using hanging culture techniques, where oysters seeded with pearl forming nuclei are hung in baskets from lines supported by buoys, and utilize natural ocean productivity as food.

Of particular interest to marine resource managers at DLNR, BPI's native cultured pearl oysters will naturally re-seed and increase depleted wild stocks of oysters, while they go through the lengthy pearl making cycle. As a public benefit of pearl farming, wild stocks of native black pearl oysters would increase over time in the general vicinity of a farm and eventually in the long term around the Islands. This species re-establishment occurs at no cost to the State.

On October 5, 2000, BPI submitted all its Federal, State and County permits for a 75 acre site in the borrow pit off the Reef Runway at the Honolulu International Airport. On August 24, 2001, approximately 11 months after DLNR accepted the application, a lease was authorized by BLNR. BPI thus became the second lease authorized under the amended Chapter 190D, HRS. However, prior to execution of the final lease, as a condition of the approval, an administrative rule change is necessary to remove the 75 acre site from a State designated 700 acre thrillcraft area off the Airport.

As of this date, BPI is still waiting for DLNR's Division of Boating and Ocean Recreation (DBOR) to hold a public hearing and obtain BLNR approval on the proposed administrative rule change. DBOR has worked with the thrillcraft and boating community to develop an acceptable compromise for adding an additional 75 acres from elsewhere to the thrillcraft area in order to supplement its loss of 75 acres to the aquaculture site. Getting official public input on this proposal is required before going to the BLNR. Once the administrative rule change is final, DLNR's Land Division can issue the lease and the project can move forward.

3.2 New Interest in Commercial Leases

With the success of CI and BPI in obtaining leases, interest continues to grow from local, national and internationally based entities. Internationally, companies from several prominent nations in offshore aquaculture have indicated strong interest in the results of the Hawaii cage research, as well as the process for securing a commercial lease. Likewise nationally, at least one company has requested information on the Hawaii process. Locally, several individuals have expressed interest, three companies have applications in process, a community group in Waianae, Oahu, has carried out a feasibility study for community-based offshore aquaculture, and two other companies are actively looking for sites.

There are three local companies that have applications in process and two have applications in preparation. Two companies with applications in process, Ahi Nui Tuna Farming Company and Ahi Farms, are interested in farming yellow fin and big eye tuna. Tuna farming has been demonstrated technically and economically feasible in several places in the World, including South Australia, where it was a $491 million industry in 2002 (Infofish, 2003).

The Ahi Nui Tuna Farming Company submitted its Federal and State permit applications and State lease request in July 2002. The project proposed to place floating net cages 4.5 miles northwest of Kawaihae Harbor in West Hawaii in approximately 170 feet of water. The total site size, including the mooring system, would be 216 acres and the cages would occupy 16 acres of surface water. However, due to comments from the West Hawaii Community, the Company is currently dropping plans for that site and will request a lease at another site further offshore. A new Environmental Assessment is currently in preparation.

General plans are for the anchored cages to be used for grow out of wild caught juvenile big eye and yellow fin tuna that are caught on barbless hooks on the fishing grounds in the Western Pacific. Captured juvenile tuna are transported to the anchored net cages in transport cages towed by a fishing boat. Upon completion of the grow-out cycle of four to eight months, the tuna will be harvested, processed and sold, primarily into the international sushi and sashimi

markets. This type of production system is currently in commercial use to grow another species, blue fin tuna, in Australia, Spain, Portugal, Mexico and the Canary Islands.

Ahi Farms Inc. is a second company planning to grow tuna on two sites off Waianae. The Company is proposing two sites of 80 acres each that can each hold up to 18 specially built cages. Small yellow fin and big eye tuna will be captured or purchased from fishermen and grown out to approximately 100 pounds. Market sized fish will be exported, primarily to Japan.

As of this writing, the Company has submitted its federal permit application and is awaiting the acceptance for processing of its State Conservation District Use Application (CDUA), with attached Environmental Assessment. Principles continue to meet with members of the community, agencies and ocean businesses that may have an interest in their project.

KBWF submitted their CDUA, with attached detailed Environmental Assessment, in November 2002 and approval of the lease occurred on November 5, 2003. Currently, the Company has submitted its Federal Army Corps of Engineers permit for processing.

KBWF plans to initially raise kahala with a series of small-to-medium-size net pens off Unualoha Point, Kona. Hatchery techniques have been developed by

KBWF, and stocking fingerlings are available from its Kona hatchery, for grow out in the nearby offshore ocean cages. The pens will be anchored in 150 feet to 200 feet of water to avoid exposure to high surf, negate environmental impacts on coral reef and avoid conflict with fishing and recreational diving. If research is successful at the Company's Kona-based marine finfish hatchery, other species such as the deep-water snappers, opakapaka and ehu, will be grown (Wedemeyer, 2001). As mentioned above, KBWF has received a $1.5M grant from the U.S. DOC to help pursue this work.

Of the two companies preparing applications, one was CI previously mentioned and the other is Pacific Ocean Ventures (POV). POV has actively searched for a site for over a year and have presently focused on waters off Maui. They are interested in utilizing submersible cages, of the type used by CI to grow moi and kahala. They are also interested in constructing their own hatchery. Permit and lease applications are currently being prepared, with a target for submission of early 2004.

3.3 Current Issues of Concern

Long-term leasing of ocean space is new for Hawaii and the concept has raised a number of issues and questions. There is a tradition to consider of managing the ocean around the Islands as a common property resource. Moreover, there is a diverse pattern of existing use of the marine environment by the military,

ocean-related businesses and the public they must be clearly understood. DLNR and DOA's ability to work with collaboratively with applicants and the concerned public to raise and resolve these issues will have a major impact on the long-term feasibility of ocean leasing for Hawaii.

To date, three ocean leases have been authorized by DLNR and the process described by Chapter 190D, HRS, successfully implemented. Initial concerns such as opportunity for public input, ceded lands payments, monitoring procedures, and mitigation of multiple use issues, have been satisfactorily managed by DLNR in the course of the initial implementation. The one active lease to CI for moi production has clearly demonstrated that a well sited and managed cage farm can be operated in an environmentally sustainable way, since there have been no use conflicts and nutrient inputs from the fish have been barely measurable outside the cage.

With the newly approved lease for kahala farming and the two lease applications for tuna farming, certain issues have re-occurred and several new concerns are being raised – specific to the locations of the projects. The most significant concerns raised by the community are: a) Pollution potential of the ocean from fish wastes and uneaten food; b) Multiple use conflicts as reflected in comments that cages are being located in locations used for fishing and diving; c) Danger of marine mammal entanglement (e.g., whales) in cages; d) Attraction of dangerous sharks to the area of the cage; and e) Spoilage of an unobstructed ocean view by

having sea cages on the surface of the ocean. Companies and regulatory agencies are actively gathering relevant information and studies and are discussing these issues with community representatives and scientific experts to attempt to develop satisfactory explanations and if necessary, mitigation strategies.

4.0 Conclusions

Chapter 190D, HRS, was amended by the Legislature and signed into law in July of 1999, to allow Hawaii to examine open ocean aquaculture leasing and significant progress has been made in the ensuing four and one half years. Shortly after the changes were signed into law, a coalition of the UH Sea Grant Program, the OI and the State ADP carried out a highly successful, multi-year cage culture demonstration project, HOARP, off Ewa Beach, Oahu. While this experiment was going on, two pioneering companies, Cates International and Black Pearls, Inc., came forward and submitted the first commercial lease applications under the new law, which they ultimately obtained in March and October, 2001, respectfully.

DLNR has actively worked with DOA, to clarify the regulatory and leasing process to move aquaculture offshore in environmentally and economically sustainable ways. Moreover, the agency has emphasized careful monitoring so

that decision-makers and the public have the information to evaluate ocean leasing for aquaculture, as a long-term, sustainable opportunity for Hawaii.

As expansion continues, DOA/ADP, the State aquaculture lead agency, will continue to play the role of the facilitator and liaison between companies requesting leases and the regulatory agencies. DOA/ADP also assists companies in completing and packaging permit applications, e.g., holding initial Permit Scoping Meetings. The Land Division of DLNR (LD/DLNR) is the responsible agency for determining environmentally acceptable resource uses and the conditions for granting the CDUA permit. LD/DLNR is also the agency that issues and administers the long-term ocean leases. Ultimately, BLNR decides on the issuance of the individual CDUA permit and lease on a project-by-project basis, balancing environmental concerns with economic development needs.

The State Department of Health, Clean Water Branch (CWB) also plays a key role in offshore development by virtue of its authority to regulate effluent discharges from cages. Ocean cages are considered point source discharges and farms that grow in excess of 100,000 pounds of product a year require a National Pollution Discharge Elimination System (NPDES) permit. To date, CWB has shown a willingness to cooperatively work with individual open ocean aquaculture projects to formulate workable permit conditions for necessary monitoring and reporting of cage effluents.

In terms of the Federal role, the U.S. Army Corps of Engineers' permitting process determines how and where cages can be anchored in State ocean waters. Further, the Corps currently is the main permitting agency for Federal marine waters, i.e., the U.S. EEZ, 3 miles to 200 miles from shore. Presently, there is no federal leasing regime for the EEZ.

These initiatives by State, University and private sector interests have put Hawaii in the forefront of U.S. efforts for national ocean aquaculture development. National interest in developing aquaculture in state and federal marine waters continues to build, justified by the urgent need to increase domestically produced seafood supplies and foster less reliance on foreign imports. Hopefully the effort will be supported with new and increased federal research funding. With the solid track record by the State, University, and private research and farming communities, Hawaii continues to be well positioned to take advantage of this emerging sector of the U.S. aquaculture industry.

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